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↳ PRODUCTS
↳ 40.- ELECTRICITY

INTRODUCTION

The students who begin their professional career as electrical installers, assemblers or electrical maintenance technicians require a hands-on learning with equipments that reflect faithfully the electrical installations in which they will work in the future. An important electrical branch are the electrical machines and the required procedures to manoeuvre with these.

The electrical machines participate in large part of industrial process. For this purpose, it is fundamental that electrical technicians know the wiring procedures of these machines from the correct interpretation of electrical diagrams and the subsequent commissioning.



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



"Worlddidac Quality Charter" and Platinum Member of Worlddidac

GENERAL DESCRIPTION

The "Practices in Installations, Wiring and Commissioning of Electrical Machines" application, WCEM, has been designed by Edibon for the formation at professional-practical level in the field of the installation, wiring and commissioning of industrial electrical motors.

This application provides the future professionals with knowledge and essential skills on the assembly, installation, wiring, commissioning and operation of the most representative industrial electrical motors such as DC Motor with Wound Rotor, AC Synchronous Three-Phase Motor Alternator, Asynchronous Three-Phase Motor of Squirrel Cage, Dahlander Three-Phase Motor, Asynchronous Single-Phase Motor with Starting Capacitor.

The application includes a specific manual in which is explained, at theoretical-practical level, the aspects concerning to the installation procedures, wiring and operation of these machines.

The WCEM includes the following elements:

- FP-STR. Assembly frame with safe electrical power supply.
- FP-KIT-4. Wiring Installation Kit.
- FP-KIT-10. Tubes and Fittings for Channelling Wiring Kit.

Elements additional:

- CHER. Tool Box.
- MED65. Digital Multimeter.
- FP-MEG. Megohmmeter.
- FP-KIT-5. Measuring Kit.
- FP-KIT-6. Signalling and Control Kit.
- FP-KIT-9. 400 VAC Circuit Breakers Kit.
- FP-KIT-11. DC Measuring Kit.
- FP-KIT-12. AC Measuring Kit.
- FP-KIT-15. Electrical Motor Protection Kit.
- FP-DLT. Delay Timer.
- Electrical Machines:
 - FP-EMT5. 200 W DC Motor with Wound Rotor.
FP-KIT-2. DC Motor Controller Installation Kit.
 - FP-EMT6. 200 W, 3000 rpm AC Synchronous Three-Phase Motor Alternator.
FP-KIT-13. DC Regulation Kit (optional).
 - FP-EMT7. 370 W, 3000 rpm Asynchronous Three-Phase Motor of Squirrel Cage.
FP-KIT-3. AC Motor Controller Installation Kit.
FP-KIT-7. Manual Starters for Three-Phase Induction Motor of Squirrel Cage Kit.
FP-ESS. Electronic Soft Starter.
FP-AUTR3PH/1K. 1kVA Three Phase autotransformer.
 - FP-EMT9. 370 W, 2800 rpm/1400 rpm Dahlander Three-Phase Motor.
FP-KIT-14. Dahlander Motor Control Kit.
 - FP-EMT11. Asynchronous Single-Phase Motor with Starting Capacitor.

Expansion learning software:

In addition, Edibon provides expansion learning software (WCEM/ICAI) to reinforce knowledge about this field.

This software is formed by:

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).
- ESL-SOF. EDIBON Student Labsoft (Student Software).

SPECIFICATIONS

The applications includes the following elements:

- **FP-STR. Assembly frame with safe electrical power supply.**

Aluminium structure:

Two aluminium struts.

Easy assembly of components via hammer head screws.

Possibility of simultaneous work of several students.

Four swivelling casters to facilitate the movement.

Dimensions:

Structure height: 1800 mm.

Width: 1500 mm.

Three-Phase connection plug.

Safe electric box:

Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.

Emergency stop mushroom (230/400V AC).

5-wire hose for connection to frame.

Signal lamp of voltage presence. Armature voltage: 200V DC.

- **FP-KIT-4. Wiring Installation Kit.**

100 meters of grey wire of 1.5 mm².

100 meters of brown wire of 1.5 mm².

100 meters of black wire of 1.5 mm².

100 meters of green/yellow wire of de 1.5 mm².

25 meters of screened wire.

- **FP-KIT-10. Tubes and fittings for channeling wiring kit.**

PVC electrical conduit for wiring installation, 5 m.

3 electrical boxes.

Cable guide.

Elements additional:

- **CHER. Tool Box.**

Crimper.

Tin.

Meter.

Insulation tape.

Heat shrink.

Voltage tester screwdriver.

Cross-head screwdriver and flat-head screwdriver.

Allen keys.

Soldering iron.

Rubber hammer.

Wire terminals and Connection terminals.

Flanges.

Wire cutter.

Screw Clamp Terminals.

- **MED65. Digital Multimeter.**

This module has a digital multimeter of about 3 ½ digits, with double-jack ending cables of about 4 mm to facilitate interconnections.

With this digital multimeter we will be able to measure:

Voltage.

Current.

Resistance.

Capacitors capacity.

Temperature.

- **FP-MEG. Megohmmeter.**

Measurement of insulation resistance.

Maximum resistance: 400 MΩ.

Continuity tester.

- **FP-KIT-5. Measuring Kit.**

Clamp Meter:

Clamp for alternating current measurements contactless.

The clamp can measure:

Current.

Voltage.

Resistance.

A voltage and continuity tester:

Voltage range: 12-690V AC.

Phases rotating detection in three-phase systems.

Polarity tester.

- **FP-KIT-6. Signaling and Control Kit.**

Three commutators:

Two positions commutator.

Three signalling lamps:

Nominal voltage: 230V AC.

Three lamps (red, yellow and green).

Emergency stop mushroom (230/400V AC):

Supply voltage: 230/400V AC.

- **FP-EMT9. 370 W, 2800 rpm/1400 rpm Dahlander Three-Phase Motor.**

Nominal power: 370 W.

Nominal voltage: 3 x 400V AC.

Frequency: 50/60 Hz.

Number of poles: 4.

Speed: 1400/2800 r.p.m.

Nominal current: 1,2 / 1,55 A.

- **FP-KIT-9. 400 VAC Circuit Breakers Kit.**

Five three pole circuit breakers:

Nominal voltage of power terminals: 400V AC.

Nominal voltage of control terminals: 230V AC.

Nominal voltage coil: 230V AC.

Auxiliary contacts: 3 NO / 2 NC.

- **FP-KIT-11. DC Measuring Kit.**

Ammeter DC (0-1,5A).

Measurement range: 0-1,5 ADC.

Voltmeter DC (0-200V).

Measurement range: 0-200V DC.

- **FP-KIT-12. AC Measuring Kit.**

Ammeter AC (0-2,5 A):

Measurement range: 0-2.5 A.

Voltmeter AC (0-400 V):

Measurement range: 0-400V AC.

- **FP-KIT-15. Electrical Motor Protection Kit.**

Thermal Relay.

Nominal voltage for power contacts: 400V AC.

Nominal voltage for the control coil: 24V AC.

Contacts:

One three-phase Normally Open Contact (NO) for power circuit.

Overcurrent Relay.

Nominal voltage for power contacts: 400V AC.

Nominal voltage for the control coil: 24V AC.

Contacts:

One three-phase Normally Open Contact (NO) for power circuit.

- **FP-DLT. Delay Timer.**

Nominal voltage: 400V AC.

Supply voltage: 24 V.

Potentiometers to adjust:

Starting time.

Starting voltage.

Stop time.

- **Electrical Machines:**

- **FP-EMT5. 200 W DC Motor with Wound Rotor.**

Nominal power: 300 W.

Armature voltage: 200V DC.

Excitation voltage: 230V DC.

Armature current: 1,5 A.

Excitation current: 0,4 A.

RPM: 3400/7500 r.p.m.

- FP-KIT-2. DC Motor Controller Installation Kit.**

DC Motor Controller:

Supply voltage: 230V AC (PH+N+G).

Three ON-OFF switches:

ON-OFF power switch.

Star-Stop control activation switch.

Internal tacho dynamo feedback switch.

Two potentiometers:

Speed control.

Torque control.

Terminals:

Rotor terminals.

Excitation terminals.

Tacho dynamo terminals.

Three driver status leds: (red, yellow and green).

Variable output voltage: 0-300V CC.

A control cabinet with door:

Dimensions:

Height: 500 mm.

Width: 400 mm.

Depth: 200 mm.

Cut rail, 2 m.

Grey cable duct for wiring, 2 m.

200 W, DC Motor with Wound Rotor.

- FP-EMT6. **200 W, 3000 rpm AC Synchronous Three-Phase Motor Alternator.**

Nominal Power: 250 W.
Nominal output voltage: 3x 400V AC.
Frequency: 50/60 Hz.
Speed: 3000 r.p.m.
Nominal output current: 1 A.
Nominal excitation current: 0,25 A.

FP-KIT-13. **DC Regulation Kit (optional).**

DC Automatic Regulator:
Generator excitation regulator.
Excitation current manual control potentiometer.
ON-OFF switch.

- FP-EMT7. **370W, 3000 rpm Three-Phase Induction Motor of Squirrel Cage.**

Nominal power: 370 W.
Nominal voltage: 3x 230/400V AC Δ/Y.
Frequency: 50/60 Hz.
Number of poles: 2.
RPM: 2730 r.p.m.
Nominal current: 1,67/ 0,97 A.

FP-KIT-3. **AC Motor Controller Installation Kit.**

Frequency controller:
Supply voltage: 230V AC.
Nominal power: 0,4 kW.
PWM output voltage connections:
Three-Phases: 230V AC.
Potentiometer for the induction motor control speed.
Setting and visualization display of the machine parameters.
EMC/EMI filter to limit electromagnetic interference.
Speed control potentiometer.
Control cabinet with door:
Dimensions:
Height: 500 mm.
Width: 400 mm.
Depth: 200 mm.

FP-KIT-7. **Manual starters kit for Three-Phase Induction Motor of Squirrel Cage.**

Manual Star-Delta starter:
Nominal Voltage: 400V CA.
Maximum current contacts: 10 A.
Star-Delta three position commutator:
0: Open circuit.
Y: star connection.
Δ: delta connection.
Direct manual starter:
Nominal Voltage: 400V CA.
Maximum current contacts: 10 A.
Two positions commutator (ON-OFF):
0: Open.
1: Close.
Manual direct starter with inversión:
Nominal Voltage: 400V CA.
Maximum current contacts: 10 A.
Three positions commutator:
0: Open.
1: Direct connection.
2: Inverse connection.

FP-ESS. Electronic Soft Starter.

Nominal Voltage: 400V AC.

Nominal current: 3,6 A.

Nominal Power: 1,5 kW.

IP: IP20.

Three poles.

Regulating potentiometer for setting the acceleration/deceleration ramp.

Regulating potentiometer for starting voltage.

FP-AUTR3PH/1K. 1kVA Three Phase autotransformer.

Three-phase autotransformer.

Nominal supply voltage: 400V AC (3PH).

Nominal output voltage: 3 x 230V AC (3PH+N).

Nominal power: 1 kVA.

Transformer connection: YY0.

- FP-EMT9. 370 W, 2800 rpm/1400 rpm Dahlander Three-Phase Motor.

Nominal power: 370 W.

Nominal voltage: 3 x 400V AC.

Frequency: 50/60 Hz.

Number of poles: 4.

Speed: 1400/2800 r.p.m.

Nominal current: 1,2 / 1,55 A.

FP-KIT-14. Dahlander Motor Control Kit.

Manual Independent Windings Commutator.

Nominal voltage: 400V AC.

Maximum contacts current: 10 A.

Three positions commutator:

0: Open circuit.

1: Winding 1.

2: Winding 2.

- FP-EMT11. Asynchronous Single-Phase Motor with Starting Capacitor.

Nominal power: 370 W.

Nominal voltage: 3 x 230V AC.

Frequency: 50/60 Hz.

Speed: 2780 r.p.m.

Nominal current: 2,53 A.

- **All necessary cables to realize the practical exercises are included.**

Cables and Accessories, for normal operation.

Manuals:

This unit is **supplied with the following manuals**: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Installation and wiring of the electrical components and devices in the assembly frame.
 - 2.- Wiring of DC Motor with Wound Rotor, its protection system and its power and control circuitry.
 - 3.- Installation and wiring of manual commutators for reversing operations of the DC Motor with Wound Rotor.
 - 4.- Installation and wiring of AC Synchronous Three-Phase Motor Alternator, its protection system and its power and control circuitry.
 - 5.- Installation and wiring of Asynchronous Three-Phase Motor of Squirrel Cage, its protection system and its power and control circuitry.
 - 6.- Installation and wiring of manual commutators for reversing operations of the Three-Phase Motor of Squirrel Cage.
 - 7.- Installation and wiring of manual Star-Delta starter and commissioning of three-phase induction motor of Squirrel Cage.
 - 8.- Installation and wiring of manual direct starter and commissioning of three-phase induction motor of Squirrel Cage.
 - 9.- Installation and wiring of manual direct starter with inversion and commissioning of three-phase induction motor of Squirrel Cage.
 - 10.- Installation and wiring of Dahlander Three-Phase Motor, its protection system and its power and control circuitry.
 - 11.- Manual speed variation of the Dahlander Motor.
 - 12.- Manual reversing operations of the Dahlander Motor.
 - 13.- Installation and wiring of Asynchronous Single-Phase Motor with Starting Capacitor, its protection system and its power and control circuitry.
 - 14.- Manual reversing operations of the Asynchronous Single-Phase Motor with Starting Capacitor.
 - 15.- Installation and wiring of Electronic Soft Starter with AC motor.
 - 16.- Configuration and commissioning of Electronic Soft Starter for AC motors.
 - 17.- Installation and wiring of automatism for Star-Delta Starting of contactors with timers.
- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

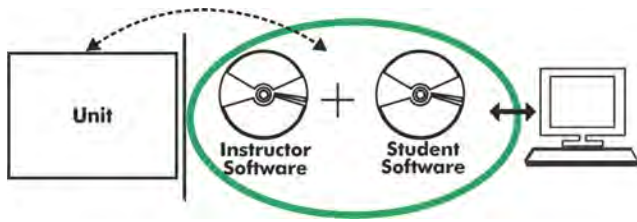
- Electrical supply: three-phase, 380 V/50 Hz or 208 V/60 Hz, 20 Kw.

DIMENSIONS AND WEIGHTS

WCEM:

- Dimensions: 1500 x 400 x 1800 mm. approx.
(59.05 x 15.75 x 70.86 inches approx.)
- Weight: 80 Kg. approx.
(194 pounds approx.)

WCEM/ICAI. Interactive Computer Aided Instruction Software System:



With no physical connection between unit and computer, this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

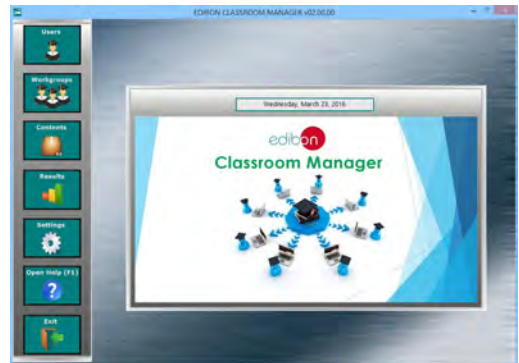
Instructor Software

- ECM-SOF. **EDIBON Classroom Manager (Instructor Software).**

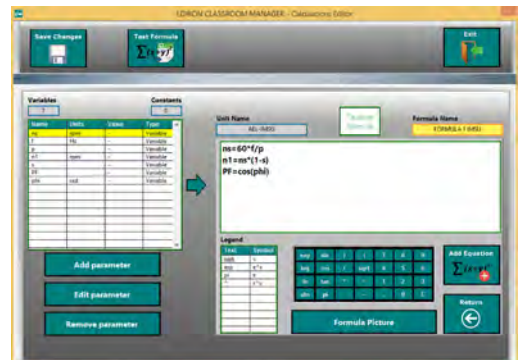
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

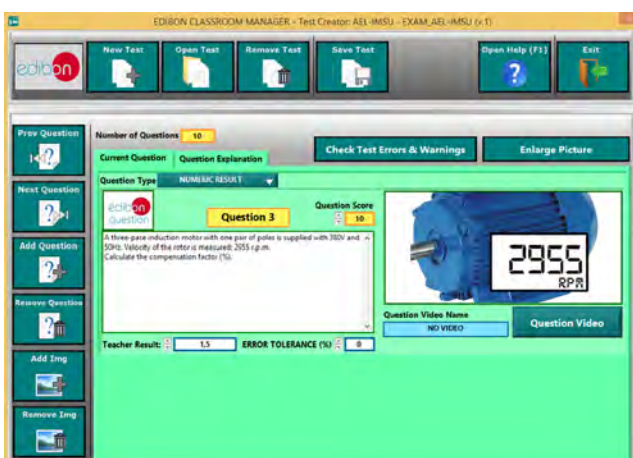
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Student Software

- ESL-SOF. **EDIBON Student Labsoft (Student Software)**.

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- Test self-correction.
- Calculations computing and plotting.
- Equation System Solver Engine.
- User Monitoring Learning & Printable Reports.
- Multimedia-Supported auxiliary resources.

For more information see ICAI catalogue. Click on the following link:

www.edibon.com/en/files/expansion/ICAI/catalog



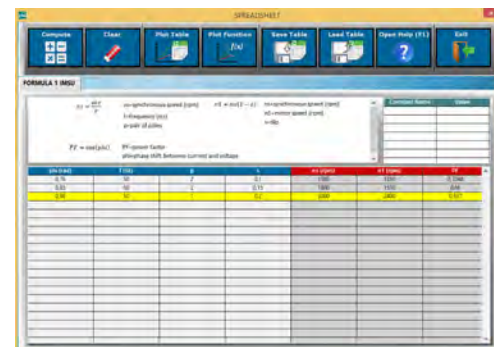
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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REPRESENTATIVE:

